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PATENT APPLICATION
DOCKET NO. 10006545-1

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**INTERNET PRINT MANAGING SYSTEM AND METHOD
WITH PRINT SERVICES STATISTICAL ANALYSIS**

00636002 10/10/00

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Cross-Reference to Related Applications

20006545-1

This patent application is related to Non-Provisional U.S. Patent Application Serial No. XX/XXX,XXX, entitled "INTERNET PRINT MANAGING SYSTEM AND METHOD WITH PRINT JOB DISTRIBUTION", having Attorney Docket No. 10003972-1, filed on even date 10 herewith, assigned to the assignee of the present invention, and incorporated herein by reference; Non-Provisional U.S. Patent Application Serial No. XX/XXX,XXX, entitled "INTERNET PRINT MANAGING SYSTEM AND METHOD WITH PRINT SERVICES COST ACCOUNTING", having Attorney Docket No. 10006537-1, filed on even date herewith, assigned to the assignee of 15 the present invention, and incorporated herein by reference; Non-Provisional U.S. Patent Application Serial No. XX/XXX,XXX, entitled "INTERNET PRINT MANAGING SYSTEM AND METHOD WITH PRINT SERVICES CONSUMABLES MANAGEMENT", having Attorney Docket No. 10006546-1, filed on even date herewith, assigned to the assignee of the present invention, 20 and incorporated herein by reference; and Non-Provisional U.S. Patent Application Serial No. XX/XXX,XXX, entitled "INTERNET PRINT MANAGING SYSTEM AND METHOD WITH PRINT SERVICES HARDWARE/SOFTWARE UPGRADE MANAGEMENT", having Attorney Docket No. 10006547-1, filed on even date herewith, assigned to the assignee of 25 the present invention, and incorporated herein by reference.

The Field of the Invention

The present invention relates generally to print services and, more particularly, to an Internet system and method of managing print services offered 30 by a print provider, including print services statistical analysis.

Background of the Invention

Typically, management of print services offered by a print provider is conducted by a person or persons deemed knowledgeable of the print services offered by the print provider. More specifically, the person or persons managing the print services of the print provider is charged with understanding the capabilities and/or limitations of the print services offered by the print provider, including equipment, materials, labor, and other resources of the print provider. In addition, the person or persons managing the print services of the print provider must also recognize the demands of print jobs presented to the print provider.

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To ensure efficient, profitable, and competitive operation of the print services of the print provider, the person managing the print services of the print provider must monitor and analyze financial and production information of the print services. Typically, the person managing the print services of the print provider must manually collect and analyze a vast quantity of data to be able to monitor and analyze key performance indicators of the print services, including financial and production aspects of the print services. Unfortunately, manually collecting and analyzing such a vast quantity of data is often a tedious and demanding task. Personal management of the print services of the print provider, therefore, may be inefficient and unproductive.

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Accordingly, a need exists for automatically managing print services of a print provider such that the print services offered by the print provider are efficient, profitable, and competitive. More particularly, a need exists for efficiently monitoring, analyzing, and reporting key performance indicators of financial and production information of the print services.

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Summary of the Invention

One aspect of the present invention provides a method of managing print services provided by a print provider. The method includes defining a print managing system controller having the print services provided by the print provider registered therewith, defining a network communication link between

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the print provider and the print managing system controller, collecting data related to the print services provided by the print provider with the print managing system controller, and analyzing the data related to the print services provided by the print provider.

5 Another aspect of the present invention provides a system for managing print services provided by a print provider. The system includes a print managing system controller configured to have the print services provided by the print provider registered therewith. As such, the print managing system controller is adapted to collect data related to the print services provided by the
10 print provider and analyze the data related to the print services provided by the print provider.

In one embodiment, the present invention provides a system and method of managing print services offered by a print provider. The system and method utilizes a network communication link between the print provider, a system administrator, and a controller of the system to automatically collect data and report statistics of the print services to the print provider and/or the system administrator.
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Brief Description of the Drawings

20 Figure 1 is a block diagram illustrating one exemplary embodiment of a print managing system according to the present invention.

Figure 2 is a block diagram illustrating one exemplary embodiment of information flow through a portion of the print managing system of Figure 1.

25 Figure 3 is a block diagram illustrating one exemplary embodiment of information flow through another portion of the print managing system of Figure 1.

Figure 4 is a block diagram illustrating one exemplary embodiment of information flow through another portion of the print managing system of Figure 1.

30 Figure 5 is a diagram illustrating one exemplary embodiment of a portion of a customer interface of the print managing system of Figure 1.

Figure 6 is a diagram illustrating one exemplary embodiment of a portion of a print provider interface of the print managing system of Figure 1.

Figure 7 is a diagram illustrating one exemplary embodiment of a job ticket for a print job received by the print managing system of Figure 1.

5 Figure 8 is a diagram illustrating one exemplary embodiment of print services of a print provider registered with the print managing system of Figure 1.

10 Figure 9 is a flow diagram illustrating one exemplary embodiment of a method of managing print services of a print provider according to the present invention.

Figure 10 is a flow diagram illustrating another exemplary embodiment of a portion of the method of Figure 9.

Figure 11 is a block diagram illustrating another exemplary embodiment of information flow through a portion of the print managing system of Figure 1.

15 Figure 12 is a diagram illustrating one exemplary embodiment of print services data collected by the print managing system of Figure 1.

Figure 13 is a diagram illustrating one exemplary embodiment of print job data collected by the print managing system of Figure 1.

20 Figure 14 is a block diagram illustrating another exemplary embodiment of information flow through a portion of the print managing system of Figure 1.

Figure 15 is a graph illustrating one exemplary embodiment of a histogram statistical model generated with the print managing system of Figure 1.

25 Figure 16 is a graph illustrating another exemplary embodiment of a histogram statistical model generated with the print managing system of Figure 1.

Figure 17 is a flow diagram illustrating another exemplary embodiment of a method of managing print services of a print provider according to the present invention.

Description of the Preferred Embodiments

In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. It is to be understood that other embodiments may be utilized and structural or logical changes may be made without departing from the scope of the present invention. The following detailed description, therefore, is not to be taken in a limiting sense, and the scope of the present invention is defined by the appended claims.

10 An Internet print managing system according to the present invention is illustrated generally at 10 in Figure 1. Print managing system 10 automatically manages print services 12 offered by a print provider 14. In one exemplary embodiment, print managing system 10 automatically performs statistical analysis for print services 12 of print provider 14. Print managing system 10, for 15 example, collects and analyzes data associated with providing print services 12. Print services statistical analysis according to the present invention is described in detail later in the application.

20 In one exemplary embodiment, print managing system 10 automatically distributes a print job 16a, 16b, 16c created or specified by a customer 18a, 18b, 18c to at least one print provider 14a, 14b, 14c offering print services 12a, 12b, 12c, respectively. For clarity, print services 12a, 12b, 12c, print provider 14a, 14b, 14c, print job 16a, 16b, 16c, and customer 18a, 18b, 18c are referred to hereinafter as print services 12, print provider 14, print job 16, and customer 18, respectively. As such, print provider 14 may be one of a plurality of print 25 providers 20 each providing separate print services 12. Customer 18 may be one of a plurality of customers 22 each having a separate print job 16.

Print services 12, as used herein, is defined to include printing services, finishing services, delivery services, and/or other print processing services including, for example, data conversion services. Print provider 14, as used 30 herein, is defined to include an entity or entities offering, providing, and/or assisting in printing services, finishing services, delivery services, and/or other

print processing services. Print job 16, as used herein, is defined to include a piece of work requiring production and/or reproduction of printed matter. Customer 18, as used herein, is defined to include an entity or entities such as a consumer, an employee, or another print provider requesting or soliciting 5 printing services, finishing services, delivery services, and/or other print processing services.

In one exemplary embodiment, print managing system 10 includes a print provider interface 24, a customer interface 26, and a print managing system controller 28. Print provider interface 24, customer interface 26, and print 10 managing system controller 28 communicate with each other via a network communication link 30. Network communication link 30, as used herein, is defined to include an Internet communication link, an Intranet communication link, or similar high-speed communication link. In one preferred embodiment, network communication link 30 includes an Internet communication link 32. 15 While the following description only refers to Internet communication link 32, it is understood that the use of other network communication links is within the scope of the present invention.

In one exemplary embodiment, print providers 20, customers 22, and print managing system controller 28 are all located remote from each other (i.e., 20 at different locations). Thus, communications between print providers 20 and print managing system controller 28, communications between customers 22 and print managing system controller 28, and communications between print providers 20 and customers 22 are conducted over Internet communication link 32. Preferably, customers 22 communicate with print managing system 25 controller 28 via Internet communication link 32. It is, however, within the scope of the present invention for customers 22 to communicate with print managing system controller 28 in other manners (e.g., a direct connection).

Print managing system 10, including print managing system controller 28, can be implemented in hardware via a microprocessor, programmable logic 30 device, or state machine, in firmware, or in software within a given device. In one aspect, at least a portion of the software programming is written in JAVA

programming language, and each of the main components communicate via Internet communication link 32 using a communication bus protocol. For example, the present invention may or may not use a TCP/IP protocol suite for data transport. Other programming languages and communication bus protocols suitable for use with print managing system 10 will become apparent to those skilled in the art after reading the present application.

Print managing system controller 28 includes hardware, software, firmware, or a combination of these. In one preferred embodiment, print managing system controller 28 includes a computer server or other 10 microprocessor based system capable of performing a sequence of logic operations. In addition, print managing system controller 28 can include a microprocessor embedded system/appliance incorporating tailored appliance hardware and/or dedicated single purpose hardware.

As illustrated in Figure 2, print provider 14 accesses print provider interface 24 of print managing system 10 via a computer terminal 34. Computer terminal 34 includes, for example, an input device such as a keyboard and/or a mouse and a display device such as a monitor, as is well known in the art. As such, print provider 14 interacts with print provider interface 24 via computer terminal 34 to register a printing capability 36 with print managing system controller 28 via Internet communication link 32. Printing capability 36 identifies attributes of print services 12 provided by print provider 14, as described below.

Print provider 14 can re-register and/or update printing capability 36 with print managing system controller 28. If, for example, print provider 14 modifies print services 12 by adding, deleting, and/or upgrading equipment, components, and/or services, print provider 14 can re-register printing capability 36 with print managing system controller 28. In addition, if print provider 14 has excess capacity or, more specifically, the ability to take on additional work, print provider 14 can update printing capability 36 in print managing system controller 28.

Re-registering and/or updating of printing capability 36 with print managing system controller 28 can be performed manually by print provider 14 and/or automatically by print managing system controller 28 and the equipment or components being added, deleted, or upgraded. In one exemplary 5 embodiment, print managing system controller 28 communicates with print provider 14 via Internet communication link 32 so as to monitor print services 12 and, more particularly, printing capability 36 of print provider 14. As such, print managing system controller 28 recognizes when equipment or components are added, deleted, or upgraded. Thus, printing capability 36 of print provider 14 10 is automatically updated by print managing system controller 28 when print services 12 of print provider 14 are modified or changed. Accordingly, print managing system 10 includes plug-and-play capabilities.

As illustrated in Figure 3, customer 18 accesses customer interface 26 of print managing system 10 via a computer terminal 38. Computer terminal 38 15 includes, for example, an input device such as a keyboard and/or a mouse and a display device such as a monitor, as is well known in the art. As such, customer 18 interacts with customer interface 26 via computer terminal 38 to generate a job ticket 40 for print job 16 and submit job ticket 40 to print managing system controller 28 via Internet communication link 32. Job ticket 40 identifies 20 attributes of print job 16 as specified by customer 18. Job ticket 40, as used herein, is defined to include a list and/or a description of a piece of work requiring production and/or reproduction of printed matter. One exemplary embodiment of job ticket 40 is described in detail later in this specification.

Print managing system controller 28 receives job ticket 40 from customer 25 18, processes job ticket 40, and distributes job ticket 40 to print provider 14. Thus, print services 12 of print provider 14 interact with job ticket 40 to extract 30 information for completing print job 16. As such, print provider 14 completes print job 16 and delivers completed print job 16 to customer 18. Delivery of completed print job 16 to customer 18 from print provider 14 is represented by dashed line 19.

In one exemplary embodiment, a status of print job 16 is tracked by job ticket 40 which customer 18 can access via customer interface 26 and Internet communication link 32 and print provider 14 can access via print provider interface 24 and Internet communication link 32. As such, configuration of job ticket 40, including which information is accessible, may be tailored specifically to customer 18 or print provider 14. Customer 18 and print provider 14 can interact with job ticket 40 via computer terminal 38 and computer terminal 34, respectively, or an appliance such as a Personal Digital Assistant (PDA).

Customer 18 also interacts with customer interface 26 to register with print managing system 10 as well as submit billing and shipping information to print managing system 10. Registering with print managing system 10 includes, for example, establishing an account by entering a user name and a user password. Submitting billing and shipping information to print managing system 10 includes, for example, submitting payment information such as a credit card or other account information and delivery information such as a shipping address.

In one exemplary embodiment, as illustrated in Figure 1, print managing system 10 includes a print managing data storage system 42. Print managing data storage system 42 constitutes a database of one or more data files for print managing system 10. Examples of print managing data storage system 42 include non-volatile memory (e.g., a hard disk drive or other persistent storage device) and may include volatile memory (e.g., random access memory (RAM)). Data is transferred to and from print managing data storage system 42 via print managing system controller 28.

In one exemplary embodiment, print managing system controller 28 communicates with and transfers printing capability 36 of print providers 20 to print managing data storage system 42. As such, print managing data storage system 42 stores printing capability 36 of print providers 20 for subsequent retrieval and processing. More specifically, when print managing system controller 28 receives printing capability 36 from print provider 14, printing capability 36 is stored as a data file in print managing data storage system 42.

Print managing system controller 28, therefore, subsequently retrieves printing capability 36 from print managing data storage system 42 for processing.

In one exemplary embodiment, as illustrated in Figure 3, a data file 44 for print job 16 is associated with job ticket 40. Thus, data file 44 of print job 16 5 is submitted with job ticket 40 and uploaded to print managing system controller 28 via Internet communication link 32. As such, print managing system controller 28 stores data file 44 of print job 16 in print managing data storage system 42 for subsequent downloading to print provider 14.

When print managing system controller 28 distributes job ticket 40 to 10 print provider 14, print managing system controller 28 also distributes data file 44 to print provider 14. Data file 44, therefore, is downloaded from print managing data storage system 42 and distributed to print provider 14 via Internet communication link 32. Thus, print job 16, including job ticket 40 and data file 44, is submitted to print provider 14 through print managing system controller 15 28. It is, however, within the scope of the present invention for data file 44 to be submitted directly to print provider 14 from customer 18.

In one exemplary embodiment, as illustrated in Figure 4, print managing system controller 28 redistributes job ticket 40 when print provider 14 is unable 20 to fulfill print job 16, either wholly or partially. Print provider 14 may be unable to fulfill print job 16 if, for example, print provider 14 underestimated an ability to complete print job 16 and/or accepted print job 16 with an intention of subcontracting all or part of print job 16 to another print provider 14. Thus, print provider 14 can transfer job ticket 40 and, therefore, print job 16 to another print provider 14.

25 In one illustrative embodiment, print managing system controller 28 initially distributes job ticket 40 to print provider 14a offering print services 12a. If, however, print provider 14a is unable to complete print job 16, either wholly or partially, job ticket 40 is resubmitted to print managing system controller 28. Thus, print managing system controller 28 reprocesses job ticket 40 and 30 redistributes job ticket 40 as a job ticket 40'. Job ticket 40' (which may include data file 44) is redistributed to another print provider 14, such as print provider

14b offering print services 12b. Print provider 14b, therefore, completes, either wholly or partially, print job 16.

For print provider 14 to register printing capability 36 and customer 18 to create job ticket 40, print provider 14 interacts with print provider interface 24 and customer 18 interacts with customer interface 26, respectively. In one exemplary embodiment, as illustrated in Figure 5, a portion of customer interface 26 includes a plurality of input fields 50 with which customer 18 interacts to specify attributes of print job 16. As such, customer 18 interacts with input fields 50, via an input device such as a keyboard and/or a mouse of computer terminal 38 or an appliance such as a Personal Digital Assistant (PDA), scanner, camera, etc., to generate job ticket 40 for print job 16.

Input fields 50 include, for example, a customer identification field 51, a file format field 52, a print medium size field 53a, a print medium type field 53b, a number of copies field 54, a printing quality option field 55, a printing layout field 56, a color printing option field 57, a finishing option field 58, and a delivery option field 59. Input fields 50 each include at least one subfield providing data entry points or representing available options for generating and submitting job ticket 40.

Customer identification field 51 includes, for example, subfields 511 and 512 which provide data entry points for a name and an address, respectively, of customer 18. File format field 52 includes, for example, subfields 521, 522, 523 which represent different file formats for print job 16. Print medium size field 53a includes, for example, subfields 531, 532, 533 which represent different sizes of print medium for print job 16. Print medium type field 53b includes, for example, subfields 534, 535, 536 which represent different types of print medium for print job 16. Number of copies field 54 includes subfield 541 in which a number of copies included in print job 16 is specified. Printing quality option field 55 includes, for example, subfields 551, 552, and 553 which represent different printing qualities, including different printing resolutions such as 1200 dpi, 600 dpi, 300 dpi, etc., for print job 16. Printing layout field 56 includes, for example, subfields 561, 562, 563, and 564 which represent different

printing layouts for print job 16. Color printing option field 57 includes, for example, subfields 571, 572, and 573 which represent different color printing options for print job 16. Finishing option field 58 includes, for example, subfields 581, 582, 583 which represent different finishing options for print job 16.

5 16. Delivery option field 59 includes, for example, subfields 591, 592, 593 which represent different delivery options and turnaround times for print job 16.

Additional file formats, print medium sizes, print medium types, printing quality options, printing layouts, color printing options, finishing options, and delivery options, as are well known in the art, may be represented by additional

10 subfields of file format field 52, print medium size field 53a, print medium type field 53b, printing quality option field 55, printing layout field 56, color printing option field 57, finishing option field 58, and delivery option field 59, respectively. Selecting and/or completing various subfields of input fields 50, therefore, identifies attributes of print job 16 as specified by customer 18.

15 In one illustrative embodiment of customer interface 26, subfields 521, 522, and 523 of file format field 52 represent a Portable Document Format (.PDF), a PostScript (.PS) format, and an AutoCAD Interchange File (.DXF) format, respectively. Selecting subfield 521, therefore, identifies the file from which print job 16 is to be printed as a Portable Document Format (.PDF) file.

20 Subfields 531, 532, and 533 of print medium size field 53a represent a Letter size, a Legal size, and an A4 size of print medium, respectively. Selecting subfield 531, therefore, identifies the size of print medium upon which print job 16 is to be printed as Letter. Subfields 534, 535, and 536 of print medium type field 53b represent a Plain, a Gloss, and a Bond type of print medium,

25 respectively. Selecting subfield 534, therefore, identifies the type of print medium upon which print job 16 is to be printed as Plain. Subfields 551, 552, and 553 of printing quality option field 55 represent a Best, a Faster, and a Custom print quality, respectively. Selecting subfield 551, therefore, identifies the Best print quality for print job 16. Subfields 561, 562, 563, and 564 of

30 printing layout field 56 represent an orientation of print job 16 including Portrait and Landscape and an imposition of print job 16 including Single-Sided and

Double-Sided, respectively. Selecting subfields 561 and 563, therefore, identifies the orientation and the imposition of print job 16 as Portrait and Single-Sided, respectively. Subfields 571, 572, and 573 of color printing option field 57 represent Color Printing, Grayscale Printing, and Monochrome Printing, respectively. Selecting subfield 571, therefore, identifies Color Printing for print job 16. Subfields 581, 582, and 583 of finishing option field 58 represent No Finishing, 3-Hole Finishing, and Staple Finishing, respectively. Selecting subfield 581, therefore, identifies no finishing option for print job 16. Subfields 591, 592, and 593 of delivery option field 59 represent Pick-up, Standard Delivery, and Express Delivery, respectively. Selecting subfield 591, therefore, identifies customer pick-up of print job 16.

In one exemplary embodiment, input fields 50 include specific equipment and/or specific services which customer 18 can select for print job 16. Specific equipment includes, for example, specific printing equipment or finishing equipment. Specific services include, for example, predefined types of print jobs such as business cards, leaflets, posters, etc. As such, specific subfields may be automatically selected and/or completed when customer 18 selects specific equipment and/or specific services. When customer 18 selects specific printing equipment, for example, printing quality and color printing options may be automatically selected. When customer 18 selects a predefined type of print job such as business cards, for example, print medium size and printing layout options may be automatically selected.

In one exemplary embodiment, input of specific input fields 50 dictates a selection of other input fields 50. When customer 18 selects a specific subfield, for example, additional subfields may appear and/or existing subfields may be unavailable. In addition, when customer 18 selects a specific subfield, additional subfields may be automatically selected and/or completed. Furthermore, customer 18 may store preferences of various subfields as common default selections.

In one exemplary embodiment, print provider 14 may also interact with job ticket 40 to input comments and/or instructions necessary for fulfilling print

job 16. As such, specific input fields 50 are accessible by both customer 18 and print provider 14. Other input fields 50, however, are accessible only by customer 18 or only by print provider 14.

In one exemplary embodiment, as illustrated in Figure 6, a portion of 5 print provider interface 24 includes a plurality of input fields 60 with which print provider 14 interacts to specify attributes of print services 12. Print provider 14 interacts with input fields 60, via an input device such as a keyboard and/or a mouse of computer terminal 34, to register printing capability 36. Input fields 60 include, for example, a print provider identification field 61, a file format options 10 field 62, a print medium size options field 63a, a print medium type options field 63b, a printing quality options field 64, a printing layout options field 65, a color printing options field 66, a finishing options field 67, and a delivery options field 68. Input fields 60 each include at least one subfield providing data entry points or representing available options for registering printing capability 36.

15 Print provider identification field 61 includes, for example, subfields 611 and 612 which provide data entry points for a name and an address, respectively, of print provider 14. File format options field 62 includes, for example, subfields 621, 622, 623 which represent different file formats that print provider 14 supports and, more specifically, file formats from which print provider 14 is 20 capable of printing. Print medium size options field 63a includes, for example, subfields 631, 632, 633 which represent different sizes of print medium upon which print provider 14 is capable of printing. Print medium type options field 63b, includes, for example, subfields 634, 635, 636 which represent different types of print medium upon which print provider 14 is capable of printing. Print 25 quality options field 64 includes, for example, subfields 641, 642, and 643 which represent different printing qualities that print provider 14 is capable of offering as print services 12. Printing layout options field 65 includes, for example, subfields 651, 652, 653, and 654 which represent different printing layouts that print provider 14 is capable of providing as print services 12. Color printing 30 options field 66 includes, for example, subfields 661, 662, and 663 which represent different color printing options that print provider 14 is capable of

offering as print services 12. Finishing options field 67 includes, for example, subfields 671, 672, 673 which represent different finishing options that print provider 14 is capable of providing as printing services 12. Delivery options field 68 includes, for example, subfields 681, 682, 683 which represent different delivery options that print provider 14 is capable of providing as print services 12.

Additional file formats, print medium sizes, print medium types, printing quality options, printing layout options, color printing options, finishing options, and delivery options, as are well known in the art, may be represented by additional subfields of file format options field 62, print medium size options field 63a, print medium type options field 63b, printing quality options field 64, printing layout options field 65, color printing options field 66, finishing options field 67, and delivery options field 68, respectively. Selecting and/or completing various subfields of input fields 60, therefore, identifies attributes of print services 12 as provided by print provider 14 in a manner similar to how selecting and/or completing various subfields of input fields 50 identifies attributes of print job 16 as specified by customer 18. Print provider 14, however, may select and/or complete multiple subfields within each input field 60 to specify the different options available with print services 12.

In one exemplary embodiment, when print provider 14 selects a specific subfield, print provider 14 may also select other subfields per the specific subfield. When print provider 14 selects a specific print medium type, for example, print provider 14 may also select various print medium sizes per the specific print medium type. In addition, print provider 14 may specify or select a range of various subfields for a specific input field 60.

It is to be understood that Figures 5 and 6 are simplified illustrations of one exemplary embodiment of customer interface 26 and print provider interface 24, respectively. The illustrative presentation of input fields 50 and 60 including the respective subfields, for example, has been simplified for clarity of the invention. The subfields may be presented, for example, as open fields, pulldown menus, toggle selections, and/or highlighted or framed selections. In

addition, customer interface 26 and/or print provider interface 24 may be presented, for example, in one or more screens or views. Furthermore, customer 18 and/or print provider 14 may generate job ticket 40 and register printing capability 36 by responding to query-based systems or applications. It is understood that such alternatives are within the scope of the present invention.

By interacting with customer interface 26 and print provider interface 24, customer 18 and print provider 14 generate job ticket 40 and register printing capability 36, respectively. In one exemplary embodiment, as illustrated in Figure 7, job ticket 40 includes a plurality of job ticket attributes 70 which define print job 16. Job ticket attributes 70 include, for example, a customer identification attribute 71, a file format attribute 72, a print medium size attribute 73a, a print medium type attribute 73b, a number of copies attribute 74, a printing quality option attribute 75, a printing layout attribute 76, a color printing option attribute 77, a finishing option attribute 78, and a delivery option attribute 79. Job ticket attributes 70 coincide with selections as specified in input fields 50 of customer interface 26.

Customer identification attribute 71 includes, for example, the name and the address of customer 18 as specified in customer identification field 51 of customer interface 26. File format attribute 72 includes the format of the file from which print job 16 is to be printed as specified in file format field 52 of customer interface 26. Print medium size attribute 73a includes the size of medium upon which print job 16 is to be printed as specified in print medium size field 53a of customer interface 26. Print medium type attribute 73b includes the type of medium upon which print job 16 is to be printed as specified in print medium type field 53b of customer interface 26. Number of copies attribute 74 includes the number of copies included in print job 16 as specified in number of copies field 54 of customer interface 26. Printing quality option attribute 75 includes the printing quality of print job 16 as specified in printing quality option field 55. Printing layout attribute 76 includes the layout of how print job 16 is to be printed as specified in printing layout field 56 of customer interface 26. Color printing option attribute 77 includes whether print job 16 is to be printed in color.

as specified in color printing option field 57 of customer interface 26. Finishing option attribute 78 includes the finish to be applied to print job 16 as specified in finishing option field 58 of customer interface 26. Delivery option attribute 79 includes how and within what time frame print job 16 is to be delivered to 5 customer 18 as specified in delivery option field 59 of customer interface 26.

In one exemplary embodiment, when data file 44 of print job 16 is submitted with job ticket 40, print managing system controller 28 infers or determines a number of job ticket attributes 70. Print managing system controller 28 determines, for example, file format attribute 72, print medium size attribute 73a, and printing layout attribute 76 of print job 16 from data file 44. 10 Customer 18, therefore, need only enter those job ticket attributes 70 which are not determined by print managing system controller 28. As such, it is not necessary for a customer 18 to enter all job ticket attributes 70.

In one exemplary embodiment, as illustrated in Figure 8, printing 15 capability 36 includes a plurality of printing capability attributes 80 which define print services 12. Printing capability attributes 80, include, for example, a print provider identification attribute 81, a file formats attribute 82, a print medium sizes attribute 83a, a print medium types attribute 83b, a printing quality options attribute 84, a printing layout options attribute 85, a color printing options attribute 86, a finishing options attribute 87, and a delivery options attribute 88. 20 Printing capability attributes 80 coincide with selections as specified in input fields 60 of print provider interface 24 in a manner similar to how job ticket attributes 70 coincide with selections as specified in input fields 50 of customer interface 26.

25 In Figure 9, a flow diagram illustrating one exemplary embodiment of a method of managing print services 12 of print providers 20, including print job distribution according to the present invention, is illustrated generally at 100. Reference is also made to Figures 1-8. At step 110, at least one print provider 14 of the plurality of print providers 20 registers a respective printing capability 36 30 for print services 12 with print managing system controller 28 and, at step 112,

customer 18 generates and submits job ticket 40 for print job 16 to print managing system controller 28.

In one exemplary embodiment, data file 44 for print job 16 is associated with job ticket 40 and submitted to print managing system controller 28 in step 5 112. Print providers 20 register printing capability 36 with print managing system controller 28 via print provider interface 24 and Internet communication link 32, as illustrated in Figure 2 and described, and customer 18 generates and submits job ticket 40 to print managing system controller 28 via customer interface 26 and Internet communication link 32, as illustrated in Figure 3 and 10 described above.

Preferably, print providers 20 register printing capability 36 at step 110 before customer 18 generates and submits job ticket 40 at step 112. It is, however, within the scope of the present invention for print providers 20 to register printing capability 36 after customer 18 generates and submits job ticket 15 40. It is also within the scope of the present invention for print providers 20 to re-register and/or update printing capability 36 in print managing system controller 28, as described above. In addition, it is also within the scope of the present invention for customer 18 to re-generate and/or re-submit job ticket 40 to print managing system controller 28.

20 Next, in step 114, after print managing system controller 28 receives job ticket 40, print managing system controller 28 compares job ticket 40 of print job 16 with print services 12, including printing capability 36, of print providers 20 to determine if print provider 14 has print services 12 to fulfill print job 16.

To compare job ticket 40 with printing capability 36, job ticket attributes 25 70 of print job 16, as specified by customer 18, are compared with printing capability attributes 80 of print services 12, as provided by print providers 20. Thus, print providers 20 having printing capability 36 to fulfill job ticket 40 and, therefore, complete print job 16 are determined. Accordingly, only those print providers 20 which have printing capability 36 to fulfill job ticket 40 are 30 identified in step 114.

DRAFT-2009060

When printing capability 36 of print providers 20 is registered with print managing system controller 28 in step 110, print managing system controller 28 stores printing capability 36 in print managing data storage system 42, as described above. As such, print managing system controller 28 retrieves printing 5 capability 36 from print managing data storage system 42 when comparing job ticket 40 with printing capability 36 in step 114.

Next, in step 116, print managing system controller 28 distributes job ticket 40 for print job 16 to print provider 14 based on print provider 14 having printing capability 36 to fulfill print job 16, as determined in step 114. In one 10 exemplary embodiment, print managing system controller 28 also distributes data file 44 for print job 16 to print provider 14 with job ticket 40.

Then, in step 118, print provider 14 completes print job 16 and, in step 120, delivers completed print job 16 to customer 18. Delivery of completed print job 16 to customer 18 from print provider 14 is also represented by dashed 15 line 19 in Figure 1.

In Figure 10, a flow diagram illustrating a portion of a method of managing print services 12 of print providers 20 is illustrated generally at 100'. Method 100' represents another exemplary embodiment of a portion of method 100. As such, method 100' includes steps 110, 112, 114, and 116 of method 100 20 as illustrated in Figure 9 and described above.

After print managing system controller 28 distributes job ticket 40 to print provider 14 in step 116, method 100' includes step 117. In step 117, whether print provider 14 is able to fulfill print job 16 is assessed. Print provider 14a, for example, may be unable to fulfill print job 16 if, for example, print 25 provider 14a underestimated an ability to complete print job 16 and/or accepted print job 16 with an intention of subcontracting all or part of print job 16 to another print provider 14, such as print provider 14b.

If print provider 14 is able to fulfill print job 16, steps 118 and 120 are performed as outlined above. If, however, print provider 14 is unable to fulfill 30 print job 16, either wholly or partially, step 119 is performed. In step 119, print managing system controller 28 reprocesses job ticket 40 and redistributes job

ticket 40 as job ticket 40' to another or additional print provider 14. Transfer or redistribution of print job 16 and, more specifically, job ticket 40 from one print provider 14 to another print provider 14 is also illustrated in Figure 4.

Next, in step 121, the other or additional print provider 14 completes
5 print job 16. Then, in step 120, completed print job 16 is delivered to customer
18, as described above.

By registering printing capability 36 in print managing system controller
28, print providers 20 can optimize use of print services 12. More specifically,
by registering and updating printing capability 36 in print managing system
10 controller 28, print providers 20 can receive print jobs 16 requiring their
respective print services 12 and/or distribute print jobs 16, either wholly or
partially, to other print providers 20. Thus, print managing system 10 allows
print providers 20 to essentially advertise print services 12 to customers 22 as
well as other print providers 20. In addition, by defining Internet
15 communication link 32 between print providers 20 and print managing system
controller 28, print jobs 16 can be efficiently and automatically distributed to
print providers 20.

Print Services Statistical Analysis

20 In one exemplary embodiment, print managing system controller 28
performs statistical analysis for print services 12 of print provider 14. Statistical
analysis for print services 12 includes collecting and analyzing data associated
with providing print services 12. More specifically, statistical analysis for print
services 12 includes, for example, defining a statistical model, determining a
25 type of data required by the statistical model, collecting the data required by the
statistical model, and generating statistics using the data. Thus, statistical
analysis for print services 12 considers, for example, cost data, production data,
and profile data related to print services 12 and/or print job 16. As such, print
managing system controller 28 automatically generates statistics for print
30 services 12 and reports the statistics to print providers 20. It is understood that

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print managing system controller 28 can perform statistical analysis for print services 12 of one or more print providers 20.

In one exemplary embodiment, as illustrated in Figure 11, print services 12 include processing equipment such as printing equipment 122 and finishing equipment 124, material and supplies 126, and other resources with which print provider 14 provides printing services, finishing services, delivery services, and/or other print processing services. Materials and supplies 126 include, for example, print medium and marking material used by printing equipment 122. Marking material, as used herein, is defined to include ink and/or toner used by printing equipment 122 of print services 12.

In one exemplary embodiment, a data file 46 for print services 12 is associated with printing capability 36. Thus, data file 46 for print services 12 is registered with printing capability 36 and uploaded to print managing system controller 28 via Internet communication link 32. As such, print managing system controller 28 stores data file 46 for print services 12 in print managing data storage system 42 (Figure 1) for subsequent processing. Data file 46 includes operational parameters of print services 12 provided by print provider 14. Operational parameters of print services 12 include, for example, specifications such as an amount of marking material consumed to create a single dot when printing an image with print services 12.

In one exemplary embodiment, data file 46 for print services 12 also includes a print services cost 48a and a print services consumables requirement 48b for print services 12 provided by print provider 14. Print services cost 48a includes, for example, a cost of equipment, materials and supplies, labor, and other resources necessary for providing print services 12. As such, data file 46 includes an operational cost of equipment such as printing equipment, finishing equipment, and other processing equipment included in print services 12, a unit cost of materials and supplies such as print medium and marking material included in print services 12, a cost of finishing services included in print services 12, a cost of delivery services included in print services 12, and other costs included in and associated with print services 12. Print services

consumables requirement 48b includes, for example, a type and an amount of materials and supplies necessary for providing print services 12. As such, data file 46 includes a type and an amount of print medium, marking material, finishing supplies, and other materials and supplies used with print services 12.

5 To perform statistical analysis for print services 12, print managing system controller 28 collects print services data 90 of print services 12 provided by print provider 14 and collects print job data 93 of job ticket 40 and data file 44 for print job 16. Print services data 90 and print job data 93 include, for example, cost data, production data, and profile data of print services 12 and/or
10 print job 16. In one exemplary embodiment, print services data 90 and print job data 93 are based on printing capability 36 of print services 12, data file 46 for print services 12 which includes print services cost 48a and print services consumables requirement 48b, job ticket 40 for print job 16, and data file 44 for print job 16. In one exemplary embodiment, print managing system controller
15 28 stores print services data 90 and print job data 93 in print managing data storage system 42 (Figure 1) for subsequent processing.

In one exemplary embodiment, as illustrated in Figure 12, print services data 90 includes cost data 91 of print services 12 and production data 92 of print services 12. Cost data 91 of print services 12 includes data based on costs
20 associated with providing print services 12 and production data 92 includes data based on production with print services 12.

Cost data 91 of print services 12 includes, for example, an operating cost 911 of print services 12, a revenue 912 of print services 12, and a profitability 913 of print services 12. Operating cost 911 of print services 12 represents a
25 cost for print provider 14 to provide print services 12. As such, operating cost 911 is based on print services cost 48a which includes a cost of equipment, materials and supplies, labor and other resources necessary for providing print services 12 determined as described in detail in above-incorporated U.S. Patent Application Attorney Docket No. 10006537-1. Revenue 912 of print services 12
30 represents a gross income produced by print services 12. Profitability 913 of print services 12 represents a net income produced by print services 12. Thus,

profitability 913 considers revenue 912 of print services 12 and operating cost 911 of print services 12.

Production data 92 of print services 12 includes, for example, a consumption 921 of print services 12 and a productivity 922 of print services 12.

5 Consumption 921 of print services 12 represents a consumables requirement of print services 12 provided by print provider 14. As such, consumption 921 is based on print services consumables requirement 48b which includes a type and an amount of materials and supplies necessary for providing print services 12 determined as described in detail in above-incorporated U.S. Patent Application

10 Attorney Docket No. 10006546-1. Productivity 922 of print services 12 represents an effectiveness of print services 12 in fulfilling print jobs 16 such as a turnaround time and/or a rate of producing print jobs 16. Thus, productivity 922 includes, for example, quantity and volume information of print jobs 16 as well as date information on receiving and completing print jobs 16.

15 In one exemplary embodiment, as illustrated in Figure 13, print job data 93 includes cost data 94 of print job 16, production data 95 of print job 16, and profile data 96 of print job 16. Cost data 94 of print job 16 includes data based on a cost to fulfill print job 16, production data 95 of print job 16 includes data based on production of print job 16, and profile data 96 includes data based on attributes of print job 16.

20 Cost data 94 of print job 16 includes, for example, a cost 941 of print job 16 and a profitability 942 of print job 16. Cost 941 of print job 16 represents a cost for print provider 14 to fulfill print job 16 including a cost to customer 18. As such, cost 941 includes a cost of equipment, materials and supplies, labor,

25 and other resources necessary to fulfill print job 16 determined as described in detail in above-incorporated U.S. Patent Application Attorney Docket No. 10006537-1. Profitability 942 of print job 16 represents a net income generated by print job 16. Thus, profitability 942 of print job 16 considers cost 941 of print job 16.

30 Production data 95 of print job 16 includes, for example, a consumption 951 of print job 16 and a productivity 952 of print job 16. Consumption 951 of

print job 16 represents a consumables requirement of print job 16. As such, consumption 951 includes a type and an amount of print medium, marking material, finishing supplies, and other materials and supplies consumed to fulfill print job 16 determined as described in detail in above-incorporated U.S. Patent 5 Application Attorney Docket No. 10006546-1. Productivity 952 of print job 16 represents a rate of producing print job 16 and includes an amount of time required to complete print job 16.

Profile data 96 of print job 16 includes, for example, a customer identification 961 for print job 16 and print job attributes 962 of print job 16. 10 Customer identification 961 for print job 16 includes a name and an address of customer 18. Customer identification 961 is included with job ticket 40 for print job 16, as illustrated in Figure 7 and described above. Print job attributes 962 of print job 16 define characteristics of print job 16, as illustrated in Figure 7 and described above. 15 Based on print services data 90 and print job data 93, print managing system controller 28 automatically performs statistical analysis for print services 12 of print provider 14. In one exemplary embodiment, as illustrated in Figure 14, print managing system controller 28 analyzes print services data 90 and print job data 93 and generates statistics 97 for print services 12 and print job 16. As such, statistics 97 are generated using print services data 90 and/or print job data 93. 20

In one exemplary embodiment, print managing system controller 28 generates statistics 97 in response to a query 98 submitted, for example, by print provider 14. As such, print managing system controller 28 reports statistics 97 25 to print provider 14 via Internet communication link 32. Thus, print provider 14 can study or interpret statistics 97 and make business decisions for print services 12 accordingly. Print provider 14, for example, may order additional printing equipment, order additional supplies, eliminate specific services, etc.

In one exemplary embodiment, print managing system controller 28 30 receives query 98 from a system administrator 99. As such, print managing system controller 28 reports statistics 97 to system administrator 99 via Internet

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communication link 32. System administrator 99 may include, for example, an entity overseeing multiple print providers 20.

In one exemplary embodiment, statistics 97 are generated using statistical models which consider one or more variable elements of print services 12 and/or print job 16. As such, print services data 90 and print job data 93 required by the statistical models are determined and collected by print managing system controller 28. In one exemplary embodiment, when submitting query 98, print provider 14 and/or system administrator 99 can specify which statistical model is to be used to generate statistics 97. With the statistical models, print provider 14 and/or system administrator 99 can analyze various aspects of print services 12 and/or print job 16.

Statistical models can be defined to analyze, for example, financial and production information of print services 12 and/or print job 16 such as revenue or profit per type of print job, revenue or profit per customer, revenue or profit per equipment piece, consumables per print job, turnaround time per print job, percentage of print jobs completed on time or within budget, equipment downtime, etc. It is understood that a variety of types and variations of statistical models can be defined based on print services data 90 and print job data 93 and that such statistical models are within the scope of the present invention.

Figures 15 and 16 are graphs illustrating one illustrative embodiment of statistical models using print services data 90 and print job data 93. In Figure 15, a histogram statistical model 190 represents, for example, the frequency of occurrence of color printing and, in Figure 16, a histogram statistical model 192 represents, for example, the frequency of occurrence of black and white printing. Histogram statistical model 190 and histogram statistical model 192 are generated by extracting production data 92 of print services data 90 and profile data 96 of print job data 93. More specifically, color print jobs and black and white print jobs, as identified by print job attributes 962 of profile data 96, are tabulated per month, as identified by productivity 922 of production data 92. Thus, with statistical models 190 and 192, print provider 14 and/or system

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administrator 99 can assess, for example, the feasibility of adding additional color printing equipment and/or the need for ordering additional materials and supplies, for example, for the month of December.

In Figure 17, a flow diagram illustrating another exemplary embodiment 5 of a method of managing print services 12 of print providers 20, including print services statistical analysis according to the present invention, is illustrated generally at 200. Reference is also made to Figures 11-16. At step 210, at least one print provider 14 of the plurality of print providers 20 registers a respective printing capability 36 for print services 12, including print services cost 48a and 10 print services consumables requirement 48b which represent a respective cost and consumables requirement of print services 12, with print managing system controller 28. At step 212, at least one customer 18 of the plurality of customers 22 generates and submits a respective job ticket 40 for a respective print job 16 to print managing system controller 28.

15 In one exemplary embodiment, data file 46 for print services 12, including print services cost 48a and print services consumables requirement 48b, is associated with printing capability 36 and registered with print managing system controller 28 in step 210. In addition, data file 44 for print job 16 is associated with job ticket 40 and submitted to print managing system controller 20 28 in step 212. Print providers 20 register printing capability 36 with print managing system controller 28 via print provider interface 24 and Internet communication link 32, as illustrated in Figure 2 and described above. Customer 18 generates and submits job ticket 40 to print managing system controller 28 via customer interface 26 and Internet communication link 32, as 25 illustrated in Figure 3 and described above.

Next, in step 214, print managing system controller 28 collects print services data 90 and/or print job data 93. More specifically, cost data 91 of print services 12 and production data 92 of print services 12, as described above, are collected and cost data 94 of print job 16, production data 95 of print job 16, and 30 profile data 96 of print job 16, as described above, are collected.

Next, in step 216, print managing system controller 28 analyzes print services data 90 and/or print job data 93. To analyze print services data 90 and print job data 93, print managing system controller 28 generates statistics 97 of print services 12 and/or print job 16 using print services data 90, print job data 5 93, or print services data 90 and print job data 93.

Then, in step 218, print managing system controller 28 presents or reports statistics 97 of print services 12 and/or print job 16 to print provider 14 and/or system administrator 99. Statistics 97 are presented to print provider 14 and/or system administrator 99, for example, in tabular and/or graphical form. 10 In one exemplary embodiment, statistics 97 are presented to print provider 14 and/or system administrator 99 from print managing system controller 28 via Internet communication link 32, as illustrated in Figure 14.

By collecting and analyzing print services data 90 and print job data 93, print managing system 10 automatically monitors financial and production 15 information of print services 12 of print provider 14. Thus, by generating statistics 97 of print services 12 and print job 16 using print services data 90 and print job data 93, and reporting statistics 97 to print provider 14 and/or system administrator 99, print managing system 10 allows print provider 14 and/or system administrator 99 to analyze various aspects of print services 12, including 20 key performance indicators, and make business decisions accordingly. In addition, by defining Internet communication link 32 between print providers 20, print managing system controller 28, and system administrator 99, statistics 97 of print services 12 can be efficiently and automatically reported to print providers 20 and/or system administrator 99.

25 Although specific embodiments have been illustrated and described herein for purposes of description of the preferred embodiment, it will be appreciated by those of ordinary skill in the art that a wide variety of alternate and/or equivalent implementations calculated to achieve the same purposes may be substituted for the specific embodiments shown and described without departing from the scope of the present invention. Those with skill in the chemical, mechanical, electro-mechanical, electrical, and computer arts will 30

readily appreciate that the present invention may be implemented in a very wide variety of embodiments. This application is intended to cover any adaptations or variations of the preferred embodiments discussed herein. Therefore, it is manifestly intended that this invention be limited only by the claims and the equivalents thereof.